

## **Top Tier Evidence Initiative:**

### **Evidence Summary for the Nurse-Family Partnership (A nurse home visitation program for low-income, pregnant women)**

#### **I. Finding of the Top Tier Evidence Initiative's Expert Advisory Panel:**

The Nurse-Family Partnership meets the Top Tier Evidence standard, defined per recent Congressional legislation to include: *Interventions shown in well-designed and implemented randomized controlled trials, preferably conducted in typical community settings, to produce sizeable, sustained benefits to participants and/or society.*

#### **II. Description of the Intervention:**

The Nurse-Family Partnership program provides nurse home visits to pregnant women with no previous live births, most of whom are (i) low-income, (ii) unmarried, and (iii) teenagers. The nurses visit the women approximately once per month during their pregnancy and the first two years of their children's lives. The nurses teach (i) positive health related behaviors, (ii) competent care of children, and (iii) maternal personal development (family planning, educational achievement, and participation in the workforce). The program costs approximately \$11,200 per woman over the three years of visits (in 2008 dollars).

[Click here to go to the program's website.](#)

#### **III. Evidence of Effectiveness:**

This summary of the evidence is based on a systematic search of the literature, and correspondence with leading researchers, to identify all well-designed and implemented randomized controlled trials of the Nurse-Family Partnership. Our search identified three such trials, each of which is summarized below.

Importantly, the three trials – each carried out in a different population and setting – all found the program to produce sizeable, sustained effects on important mother and child outcomes. This provides confidence that this program would be effective if faithfully replicated in other, similar populations and settings. However, the specific types of effects often differed across the three studies. For example, two of the trials found a reduction in mothers' receipt of welfare, whereas the third trial did not. These differences may be caused by (i) differences in the study populations across the three trials (e.g., different rates of pre-program welfare participation); (ii) differences in the time periods when the trials were conducted (e.g., whether before or after the major 1996 welfare reforms); or (iii) other, unknown factors. Thus, although the study results provide confidence of *overall* effectiveness, they offer less confidence that a faithful replication of this program will reproduce the *specific* effects found in any one trial.

The specific effects that were replicated, with no countervailing findings, in two or more of the trials – and thus are the most likely to be reproducible in a program replication – are: (i) reduction in measures of child abuse and neglect (including injuries and accidents), (ii) reduction in mothers' subsequent births, (iii) reduction in prenatal smoking among mothers who smoked at the start of the

study,<sup>1</sup> and (iv) improvement in cognitive and/or academic outcomes for children born to mothers with low psychological resources (i.e., intelligence, mental health, self-confidence).

What follows is a summary of each trial and its main findings. All effects discussed are statistically significant at the 0.05 level unless stated otherwise.

### **Study 1 (Elmira, New York)**

This was a randomized controlled trial of 300 women in Elmira, New York, a semi-rural community. The women, who had agreed to enroll in the study, were randomly assigned either to (i) a group given the opportunity to participate in the Nurse-Family Partnership, or (ii) a control group that was provided developmental screening and referral to treatment for their child at ages 1 and 2 and, in some cases, free transportation to prenatal and well-child care.

Approximately 90% of the women were white, 60% were low income, and 60% were unmarried. Their average age was 19.

#### **Effects on the first-born children of the nurse-visited women at age 15 (versus the control group):**

- 48% fewer officially-verified incidents of child abuse and neglect (an average of 0.26 incidents per nurse-visited child versus 0.50 per control group child).
- 59% fewer self-reported arrests (an average of 0.15 versus 0.37).
- 57% fewer self-reported convictions and probation violations (an average of 0.10 versus 0.23). *This effect was statistically significant at the .10 level, but not the .05 level.*
- No significant effects on incidence of (i) smoking or use of alcohol or drugs, (ii) running away or being stopped by police, or (iii) being sent to youth corrections.
- No significant effects on the number of (i) self-reported major delinquent acts, (ii) school suspensions, or (iii) parent, teacher, or child reports of behavior problems.
- No significant effects on the percent of children who had had sexual intercourse, become pregnant, or caused a pregnancy.

#### **Effects on the nurse-visited women when their children reached age 15 (versus the control group):**

- 20% less time spent on welfare (an average of 53 months per nurse-visited woman versus 66 months per woman in the control group). *This effect was statistically significant at the .10 level, but not the .05 level.*
- 19% fewer subsequent births (an average of 1.3 births versus 1.6).
- 61% fewer self-reported arrests (an average of 0.13 versus 0.33).

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<sup>1</sup> The reduction in prenatal smoking is not discussed in detail in this summary because of the summary's focus on longer-term life outcomes. However, the smoking reduction may have affected some of these longer-term outcomes (e.g., child cognitive development).

- 72% fewer self-reported convictions (an average of 0.05 versus 0.18).
- There were no significant effects on months employed, months on food stamps or Medicaid, or behavior-impairing substance abuse.

There was suggestive evidence that the above effects on the children and women were largest for the subgroup of women who, at study enrollment, were unmarried and of low socioeconomic status.

**Discussion of study quality:**

- This was a relatively large study with a long-term follow-up (child age 15) and low attrition: Data on the outcomes described above were obtained for 79-83% of the original sample (depending on the outcome), and follow-up rates were similar for the nurse-visited and control groups.
- At the child age-15 follow-up, the women in the nurse-visited group and those in the control group were largely equivalent in their observable pre-program characteristics (e.g., demographics).
- The study measured outcomes for all mothers and children assigned to the nurse visitation group, regardless of whether or how long they actually participated in the program (i.e., the study used an “intention-to-treat” analysis).
- Official records of criminal activity and/or delinquency, although not complete, tended to corroborate the mothers’ self-reports. (Such crime/delinquency records were too incomplete to provide similar corroboration for the children’s self-reports.)
- Research staff gathering outcome data were blind as to whether women were assigned to the nurse-visitation group or the control group.

**Study 2 (Memphis, Tennessee)**

This was a randomized controlled trial of 743 women in Memphis, Tennessee. The women, who had agreed to participate in the study, were randomly assigned to (i) a group given the opportunity to participate in the Nurse-Family Partnership, or (ii) a control group that was provided free transportation to scheduled prenatal medical appointments, and developmental screening and referral to treatment for their child between birth and age 2.

Approximately 90% of the women were African-American, 85% came from households with income at or below the poverty line, and almost all were unmarried. Their average age was 18.

**Effects on the first-born children of nurse-visited women at age 2 (versus the control group):**

- 23% fewer health care encounters for children's injuries or ingestions (an average of 0.43 encounters per child in the nurse-visited group vs. 0.56 in the control group).
- 78% fewer days hospitalized for injuries or ingestions (an average of .04 days versus .18 days).
- No significant effects on children's immunization rates, mental development, or behavioral problems.

**Effects on the first-born children of nurse-visited women at age 9 (versus the control group):**

- Lower mortality rate (0.4% of the children in the nurse-visited group died before age 9 vs. 1.9% of children in the control group). *This effect was statistically significant at the .10 level, but not the .05 level. Most excess deaths in the control group were attributable to causes that are often preventable (e.g., injury, SIDS).*
- The subsample of children whose mothers had low psychological resources prior to program participation (i.e. were in the lower half of the sample in intelligence, mental health, and self-confidence) made sizeable gains in academic performance. These children:
  - Scored 9 percentile points higher on Tennessee state reading and math achievement tests in grades 1-3 (the nurse-visited group scored in the 45th percentile vs. the 36th percentile for their control group counterparts).
  - Had 10% higher reading and math grade point averages (GPA) in grades 1-3 (average GPA of 2.68 vs. 2.44).
  - There were no significant effects on these children's grade retentions, special education placements, or teacher or mother-reported behavioral outcomes.
- For the whole sample of children (as opposed to the above subsample), there were no significant effects on academic performance (e.g. test scores, grade retentions, special education placements), or conduct or behavioral outcomes.

**Effects on the nurse-visited women when their children reached age 9 (versus the control group):**

- 12% less time on welfare during the nine years (5.2 months per year for the nurse-visited women vs. 5.9 months per year for control group women).
- 10% less time on food stamps during the nine years (7.0 months per year vs. 7.8 months per year).
- 13% fewer subsequent live births (an average of 0.81 births vs. 0.93).
- 33% fewer subsequent low birth weight newborns (an average of 0.18 low birth weight newborns vs. 0.27). *This effect was significant at the .10 level, but not the .05 level.*
- 18% more time with their current partner (an average of 61.6 months vs. 52.4 months).
- 41% fewer substances used in the past three years – i.e. marijuana, cocaine, or moderate-heavy alcohol use (an average of 0.10 substances vs. 0.17). *This effect was significant at the .10 level, but not the .05 level.*
- No significant effects on mother's employment rate, Medicaid receipt, rate of marriage or partnership, depression, arrests, abortions, miscarriages, stillbirths, or domestic violence experienced.

### **Discussion of study quality:**

- This was a large study with a long-term follow-up (child age 9) and low attrition: Data on the outcomes described above were obtained for 77-90% of the original sample (depending on the outcome), and follow-up rates were similar for the nurse-visited and control groups.
- At the child age-2 and age-9 follow-ups, the women in the nurse-visited group and those in the control group were largely equivalent in their observable pre-program characteristics (e.g., demographics, self-reported substance use).
- The study measured outcomes for all mothers and children assigned to the nurse-visited group, regardless of whether or how long they actually participated in the program (i.e., the study used an “intention-to-treat” analysis).
- The study used a variety of sources to measure outcomes, including mother and teacher reports (e.g., of child behavior), school records (e.g., achievement test scores, GPA), and state administrative records (e.g. welfare receipt).
- Research staff gathering outcome data were blind as to whether women were assigned to the nurse-visited group or the control group.
- The study evaluated the program as it is typically implemented on a large scale in a low-income community, thus providing evidence about the intervention's effectiveness in a real-world setting.

### **Study 3 (Denver, Colorado)**

This was a randomized controlled trial of 490 women in Denver, Colorado. The women, who had agreed to participate in the study, were randomly assigned to (i) a group given the opportunity to participate in the Nurse-Family Partnership or (ii) a control group provided with developmental screening and referral to treatment for their children between birth and age 2.

These women were almost all low-income (their annual household income averaged \$17,800 in 2008 dollars), 46% were Mexican American, 36% were white, 15% were African American, and 84% were unmarried. Their average age was 20.

### **Effects on the first-born children of nurse-visited women at age 4 (versus the control group):**

- The subsample of children whose mothers had low psychological resources prior to program participation (i.e. were in the lower 40th percentile of the sample in intelligence, mental health, and self-confidence) made sizeable gains in researcher-assessed –
  - Language development (standardized effect size of 0.31<sup>2</sup>);
  - Behavioral adaptation – e.g., attention, impulse control, sociability (standardized effect size of 0.38); and

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<sup>2</sup> To provide a general, intuitive sense of what these “standardized effect sizes” mean, an effect size on child IQ of 0.31 translates to 4.6 IQ points; an effect size of 0.38 translates to 5.7 IQ points, and an effect size of 0.47 translates to 7.1 IQ points.

- Executive functioning – e.g., capacity for sustained attention, fine and gross motor skills (standardized effect size of 0.47).
- There were no significant effects on emotional regulation (e.g., anxiety, regulation of mood, or mother-reported rule-breaking or aggressive behavior).
- For the whole sample of children (as opposed to the above subsample), there were no significant effects on these child outcomes.

**Effects on the nurse-visited women when their children reached age 4 (versus the control group):**

- There were no significant effects on most of the women’s outcomes, including welfare receipt; employment; high school graduation; mental health; substance use; percent married or living with a partner; or number of subsequent births, abortions, miscarriages, or low birth weight newborns.
- There were a few significant effects, as follows:
  - 20% longer interval between the women’s 1st and 2nd births (24.5 months for the nurse-visited women vs. 20.4 months for the control group).
  - Lower percentage of women experienced domestic violence from their partner in the past 6 months (7% versus 14%).

*The effect on domestic violence may be due to chance given the sizeable number of maternal outcomes that the study measured. The effect on the interval between births is more likely to be valid since similar effects were found in the Elmira and Memphis trials.*

**Discussion of study quality:**

- This was a large study with a moderately long-term follow-up (child age 4) and low attrition: Data on the outcomes described above were obtained for 82-86% of the original sample (depending on the outcome), and follow-up rates were similar for the nurse-visited and control groups.
- At the child age-4 follow-up, the women in the nurse-visited group and those in the control group were largely equivalent in their observable pre-program characteristics (e.g., demographics, self-reported substance use).
- The study measured outcomes for all mothers and children assigned to the nurse-visited group, regardless of whether or how long they actually participated in the program (i.e., the study used an “intention-to-treat” analysis).
- Children's mental development and language skills were measured through assessments whose reliability and validity are well-established (e.g., Preschool Language Scales-3).
- The research staff administering these assessments and other outcome measures were blind as to whether women were assigned to the nurse-visited or the control group.

- The study evaluated the program as it is typically implemented on a large scale in a low-income community, thus providing evidence about the intervention's effectiveness in a real-world setting.

#### Other Studies:

One other randomized controlled trial of the Nurse-Family Partnership has been conducted. Its results, although short-term, are generally consistent with the results of the studies described above. However, this trial falls outside our initiative's criteria (e.g., because it did not use an "intention-to-treat" approach to estimate the program's effects), and so is not summarized here.

#### IV. References:

##### Study 1 – Elmira, New York

- Luckey, Dennis W., David L. Olds, Weiming Zhang, Charles Henderson, Michael Knudtson, John Eckenrode, Harriet Kitzman, Robert Cole, and Lisa Pettitt. "Revised Analysis of 15-Year Outcomes in the Elmira Trial of the Nurse-Family Partnership." Prevention Research Center for Family and Child Health, University of Colorado Department of Pediatrics, 2008.
- Olds, David L., Charles R. Henderson Jr, Robert Cole, John Eckenrode, Harriet Kitzman, Dennis Luckey, Lisa Pettitt, Kimberly Sidora, Pamela Morris, and Jane Powers. "Long-term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior: 15-Year Follow-up of a Randomized Controlled Trial." *Journal of the American Medical Association*, vol. 280, no. 14, October 14, 1998, pp. 1238-1244.
- Olds, David L., John Eckenrode, Charles R. Henderson Jr, Harriet Kitzman, Jane Powers, Robert Cole, Kimberly Sidora, Pamela Morris, Lisa M. Pettitt, and Dennis Luckey. "Long-term Effects of Home Visitation on Maternal Life Course and Child Abuse and Neglect: 15-Year Follow-up of a Randomized Trial." *Journal of the American Medical Association*, August 27, 1997, vol. 278, no. 8, pp. 637-643.
- Olds, David L., Charles R. Henderson, Jr., and Robert Tatelbaum. "Prevention of Intellectual Impairment in Children of Women Who Smoke Cigarettes During Pregnancy," *Pediatrics*, February 1994, vol. 93, no. 2, pp. 228-233.
- Olds, David L., Charles R. Henderson, Jr., and Harriet Kitzman. "Does Prenatal and Infancy Nurse Home Visitation Have Enduring Effects on Qualities of Parental Caregiving and Child Health at 25 to 50 Months of Life?" *Pediatrics*, January 1994, vol. 93, no. 1, pp. 89-98.
- Olds, David L., Charles R. Henderson, Jr., Robert Tatelbaum, and Robert Chamberlin. "Improving the Life-Course Development of Socially Disadvantaged Mothers: A Randomized Trial of Nurse Home Visitation," *American Journal of Public Health*, 1988, vol. 88, no. 11, pp. 1436-1444.
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- Olds, David L., Charles R. Henderson, Jr., Robert Tatelbaum, and Robert Chamberlin. "Improving the Delivery of Prenatal Care and Outcomes of Pregnancy: A Randomized Trial of Nurse Home Visitation," *Pediatrics*, January 1986, vol. 77, no. 1, pp. 16-27.

### **Study 2 – Memphis, Tennessee**

- Olds, David L., Harriet Kitzman, Carole Hanks, Robert Cole, Elizabeth Anson, Kimberly Sidora-Arcoleo, Dennis W. Luckey, Charles R. Henderson Jr, John Holmberg, Robin A. Tutt, Amanda J. Stevenson and Jessica Bondy. "Effects of Nurse Home Visiting on Maternal and Child Functioning: Age-9 Follow-up of a Randomized Trial." *Pediatrics*, vol. 120, October 2007, pp. e832-e845.
- Olds, David L., Harriet Kitzman, Robert Cole, JoAnn Robinson, Kimberly Sidora, Dennis W. Luckey, Charles R. Henderson Jr, Carole Hanks, Jessica Bondy and John Holmberg. "Effects of Nurse Home-Visiting on Maternal Life Course and Child Development: Age 6 Follow-Up Results of a Randomized Trial," *Pediatrics*, vol. 114, no 6, December 2004, pp. 1550-1559.
- Kitzman, Harriet, David L. Olds, Kimberly Sidora, Charles R. Henderson Jr, Carole Hanks, Robert Cole, Dennis W. Luckey, Jessica Bondy, Kimberly Cole, and Judith Glazner. "Enduring Effects of Nurse Home Visitation on Maternal Life Course." *Journal of the American Medical Association*, vol. 283, no. 15, April 19, 2000, pp. 1983-1989.
- Kitzman, Harriet, David L. Olds, Charles R. Henderson Jr, Carole Hanks, Robert Cole, Robert Tatelbaum, Ken M. McConnochie, Kimberly Sidora, Dennis W. Luckey, D Shaver, Kay Engelhardt, D James and K. Bernard. "Effect of Prenatal and Infancy Home Visitation by Nurses on Pregnancy Outcomes, Childhood Injuries, and Repeated Childbearing." *Journal of the American Medical Association*, vol. 278, no. 8, August 27, 1997, pp. 644-652.

### **Study 3 – Denver, Colorado**

- Olds, David L., JoAnn Robinson, Lisa Pettitt, Dennis W. Luckey, John Holmberg, Rossanna K. Ng, Kathy Isacks, Karen Sheff and Charles R. Henderson Jr. "Effects of Home Visits by Paraprofessionals and by Nurses: Age 4 Follow-Up Results of a Randomized Trial." *Pediatrics*, vol. 114, no. 6, December 2004, pp 1560-1568.
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### **Other studies**

- Nagle ,Geoffrey A. and Neil W. Boris, "Nurse Home Visiting Impact on Prenatal Maternal Depression and Partner Violence: Preliminary Results," Tulane University Health Sciences Center - Tulane School of Medicine, 2008.

*Note: Panel members Dan Levy, Steve Raudenbush, and Howard Rolston did not participate in the Advisory Panel's review of this intervention.*